

Status report

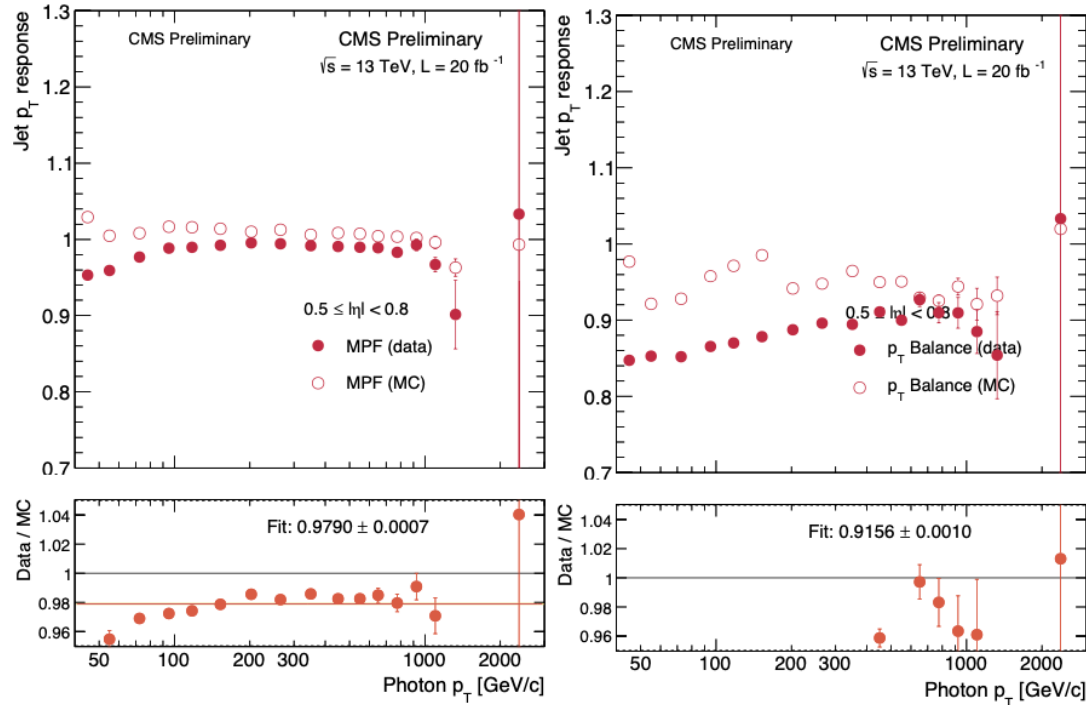
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HYU / IP2I

Reproducing plots for JES in gamma+jet

Reminder



Alpha < 0.4 Closure
2016 APV
Run BCDEF

Understanding plots (Ref: [Closure: G+Jets](#) from Stephanie)...

- Plots with 1) Jet p_T response, 2) Alpha value, for photon p_T per eta ranges
- Jet p_T response = R, response estimator
- Ideal case: converged into 1 for DATA and MC

- R for Balance method:

$$R_{bal} = \frac{p_{T,reco}^{1^{er}jet}}{p_T^\gamma}$$

1)

- R for MPF:

$$R_{MPF} = 1 + \frac{\vec{p}_T^\gamma \cdot \vec{E}_T}{|\vec{p}_T^\gamma|^2}$$

$$2) \quad \alpha = \frac{p_T^{2^{e}jet}}{p_T^\gamma}$$

(Hugues's thesis, [CMS-CR-2012-188*](#))

JES in Gamma + jet

JMENanoRun3 (v2p1)

- EGamma Run2022{C,D}
- GJet_Pt-15To6000_TuneCP5-Flat_13p6TeV_pythia8

Plot reproducing

- Referred binning in NewGammaJet ([github](#))
- [pT binning](#): [33, 40, 50, 60, 85, 105, 130, 175, 230, 300, 400, 500, 700, 1000, 3000]
- [eta binning](#): [0, 0.783, 1.305, 1.93, 2.5, 2.964, 3.2, 5.191]
- [alpha binning](#): [0, 0.1, 0.15, 0.2, 0.25, 0.3]

Selections

- HLT Photon Path
 - HLT_Photon{30,110}EB_TightID_TightIso (for data only)
 - HLT_Photon{20,33,50,75,90,120,150,175,200}
- nselJet >= 1 && nselPhoton == 1 && nvetoLeptons == 0 && dPhi(jet1, photon) > 2.8
 - Photon: pT > 33 && |eta| < 1.44 && cutBased TightID
 - Jet: pT > 20 && |eta| < 5.2 && TightID && dR(jets,photon) > 0.2
 - vetoLeptons (Electron/Muon): Loose ID && pT > 10

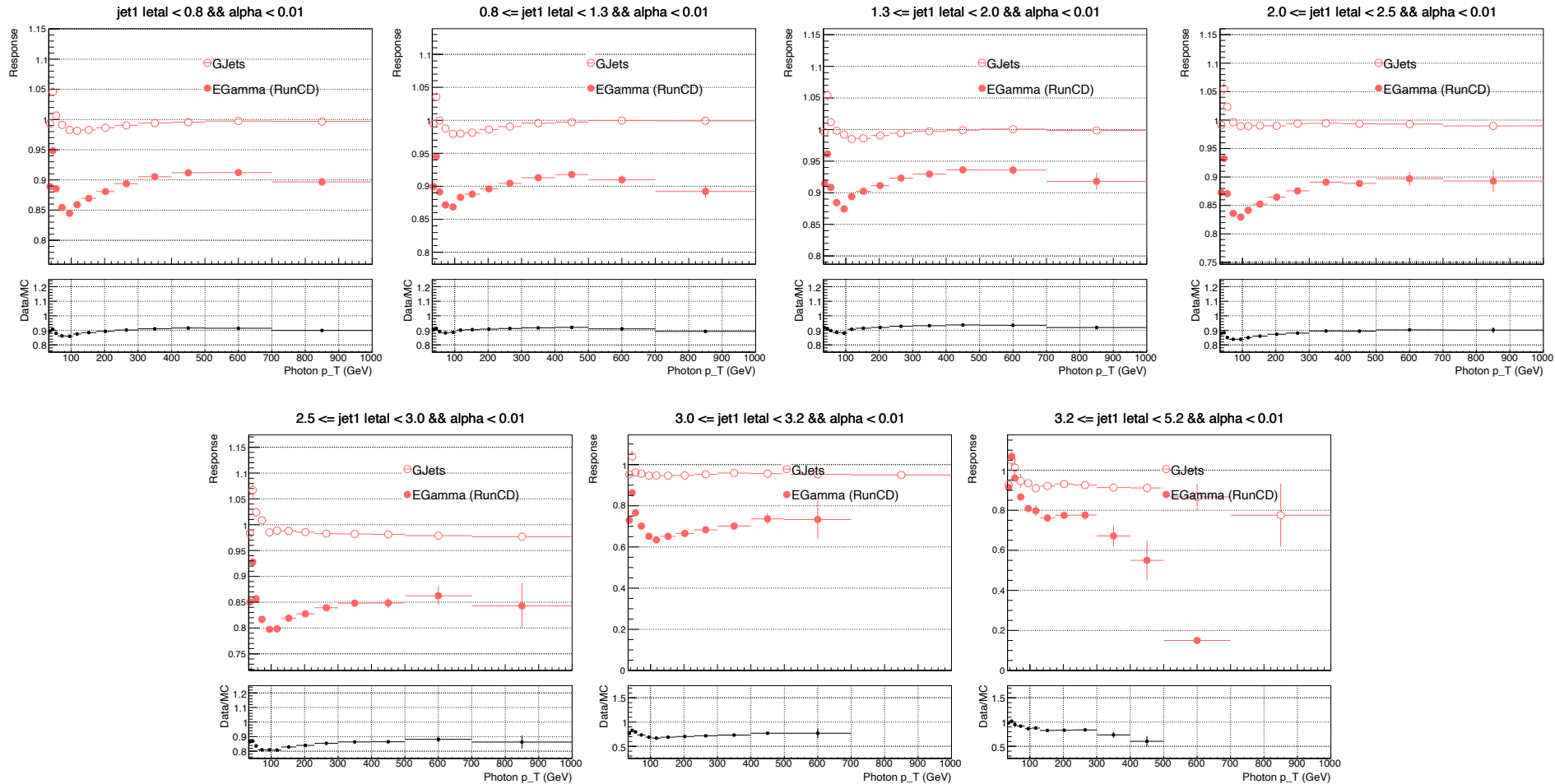
Private code ([github](#)) was available for

- Response w.r.t. photon pT / jet1 eta / alpha for extracting median
- Response (median) vs photon pT w.r.t. jet1 eta / alpha
- Not we will move to coffea (sami's [gitlab](#))

Reproducing plots for JES study

Target histograms with private code (Egamma RunCD vs Gjets Flat)

- Jet Response (median) with given photon pT and Leading jet eta
- Alpha < 0.01



Measuring HLT efficiency

Trigger efficiency in data

- Efficiency = Events passing offline selection and reference HLT path AND signal HLT path
/ Events passing offline selection and reference HLT path
- In orthogonal dataset

Strategy

- **Target HLT path**
 - HLT_PFHT400_FivePFJet_100_100_60_30_30_DoublePFBTagDeepJet_4p5_v2
 - HLT_PFHT400_FivePFJet_100_100_60_30_30_DoublePFBTagDeepCSV_4p5_v9
- Reference HLT path
 - HLT_IsoMu20 (not 24 nor 27 nor 30?)
- Target Sample
 - SingleMuon Run2022C (PromptNanoAOD)
 - /SingleMuon/Run2022C-PromptNanoAODv10-v1/NANOAOD ([DAS](#))
- Selection
 - Cut0
 - **HLT**
 - nsel40Jets >= 6 && nsel80Jets >= 3 && nselbJets (DeepJetM, DeepCSV) >= 3
 - Jet1 > 170 GeV && Jet2 > 130 GeV && Jet3 > 80 GeV
 - goodHT > 500 GeV
 - minChi2 < 15
 - Invariant mass of 2nd Top > 250 GeV
 - H_mass > 100 GeV

Measuring HLT efficiency

Trigger efficiency in data

- $\text{Efficiency} = \frac{\text{Events passing offline selection and reference HLT path AND signal HLT path}}{\text{Events passing offline selection and reference HLT path}}$
- In orthogonal dataset

Efficiency

- Tested with one file (918304 events, transferring by rucio...Done)
- Target HLT path
 - HLT_PFHT400_FivePFJet_100_100_60_30_30_DoublePFBTagDeepJet_4p5_v2
 - HLT_PFHT400_FivePFJet_100_100_60_30_30_DoublePFBTagDeepCSV_4p5_v9
- Reference HLT path
 - HLT_IsoMu20 (not 24 nor 27 nor 30?)

HLT Path	DeepJet	DeepCSV
AND	0	0
Only IsoMu	0	

Will try on other methods / more statistics..